

# Financial Cookbook

The Calculator that Does all the Work

T H E M A N U A L

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**NOTICE:** This manual describes the use of the FINANCIAL COOKBOOK. While the FINANCIAL COOKBOOK is a sophisticated financial tool, it is dependent upon tax rates, tables and laws that are subject to revision by Congress and interpretation by the IRS and by the courts. It is also dependent upon, and, therefore, any evaluation of its computations must take into consideration, interest rates and rates of inflation that are prone to fluctuation. Accordingly, Electronic Arts cannot and does not warrant the FINANCIAL COOKBOOK. Electronic Arts encourages you to use and interpret the FINANCIAL COOKBOOK only in conjunction with information and advice obtained from your financial advisor.

# Basic Facts About Financial Cookbook

For basic operating instructions, see the "HOW TO OPERATE FINANCIAL COOKBOOK" reference card located in the pocket with your disk.

## HOW FINANCIAL COOKBOOK USES THE SCREEN

The second line from the bottom of the screen is your command menu. It always contains a list of commands you may use immediately. Look to the line just below it for reminder messages about how to turn on and use the command menu and about how to select recipes and entries within recipes. Look to the line at the top of the screen for the name of what you're working on. (Helpful messages will also appear here if the program encounters any difficulties while it's running. See page 3 for more information.)

Financial Cookbook does its work in the screen window between the top screen line and the command menu. While it computes answers and fills in tables, it will – if necessary – scroll the information upward through the screen window. Typically, it will jump back to the top of the recipe when it is finished so that you may study your entries and a filled-in answer summary. (See the reference card for information about how to use keystrokes or a pointing device to scroll through a recipe and table.)

*NOTE: When you change an entry and then move the highlight to a new entry, the computer will automatically erase any existing answer summary and table. This feature protects you from accidentally using a recipe result in which the answers don't match the entries.*

## HOW FINANCIAL COOKBOOK DEALS WITH NUMBERS AND TIME

All numbers are rounded off to the nearest dollar before they are displayed. When the numbers grow large, they will be rounded off to the nearest thousand or million dollars (1,000K = 1,000,000 and 1,000M = 1,000,000,000.)

The computer does not round numbers off except for the purpose of displaying them. While it computes, it uses the numbers in full decimal form. This can produce table results which sometimes look peculiar. For instance, if called upon to add 4.3 and 4.3, the program will find the correct answer of 8.6. But when asked to display the details of its work, it will round 4.3 down to 4 and 8.6 up to 9 so that it will seem to be saying that 4 plus 4 equals 9.

All deposits and payments are presumed to take place at the beginning of the year or month listed; all balances reflect end of the month or year computations.

## A SUMMARY OF THE FINANCIAL COOKBOOK COMMANDS

The commands available in the command menu change in response to what you have on the screen.

When you choose INDEX, the command menu will change to read:  
RECIPE CATALOG PROFILE  
QUIT FORMAT-DISK

When you choose RECIPE, the command menu will change to read:  
COMPUTE INDEX PRINT SAVE  
CATALOG

When you choose CATALOG, the command menu will change to read:  
LOAD INDEX PRINT QUIT  
DELETE RENAME CATALOG  
COPY-DISK FORMAT-DISK  
DRIVE2

■ **Recipe** – puts the highlighted recipe on the screen.

■ **Compute** – uses the numbers you've entered to find the answer the recipe calls for.

■ **Index** – puts on the screen the list of recipes in the Cookbook.

■ **Print** – prints out a complete copy of the recipe currently displayed. If the recipe output is longer than 66 lines, make sure you have continuous form paper in your printer before using Print. See the reference card that came with your disk for more information about printing.

■ **Profile** – lets you enter figures which you would like to have inserted automatically whenever a recipe calls for them. Your settings will remain in memory until you turn the computer off. You may save the settings in memory onto a document disk by using the Save-To-Disk command. Profile settings saved onto a document disk will be loaded into memory whenever you use the Catalog command while that disk is in the active drive. Specifically, you may save figures for:

**Interest rate earned** – the annual percentage you expect to earn before taxes on an investment ("principal") in a savings account or other investment. Also known as "rate of return". Used as the "discount rate" (see glossary, page 24) in computations involving present value (see present value discussion on page 6.)

**Compounding periods** – the number of times during a year that interest is computed and added to the principal. Most banks compound passbook savings accounts daily, or 365 times in a year, so that's the figure the Cookbook will insert unless you change it here in the profile.

**Mortgage interest rate** – the annual rate used to figure the monthly interest due on a home loan.

**Inflation rate** – the annual rate of increase in prices; used also to compute projected buying power for future amounts.

**Federal marginal tax rate** – the percentage you'll pay in taxes to the federal government on the next dollar you earn. (See recipe 1 and the notes on page 8 for help in figuring out what number to use.)

**State marginal tax rate** – the percentage you'll pay in taxes to your state government on the next dollar you earn. (See recipe 1 and the notes on page 8 for help in figuring out what number to use.)

**Capital gains rate** – the percentage of a sum subject to taxation under the laws governing taxation of long term capital gains; as of March 1, 1984, that figure was 40% for federal income tax purposes.

**Marginal tax rate** – a figure combining your federal and state marginal tax rates; see recipe 1 and the notes on page 8 for more information.

■ **Save** – lets you save a copy of a filled in recipe onto a document disk. (Use the Format-Disk command described below to create a document disk. Document disks may also be used with Electronic Arts' Cut and Paste word processing program. Financial Cookbook documents – i.e., filled in recipes – may be on the same disk with documents written with Cut and Paste. Cut and Paste may not be used to edit Financial Cookbook documents.)

**Save-New** – lets you give a name to a recipe you're saving for the first time and then lets you save it.

**Don't-Save** – puts the recipe back on the screen without saving it

**Save-Same** – saves the recipe, using the same name you last saved it under.

■ **Catalog** – puts on the screen a list of the documents saved on your document disk.

■ **Format-disk** – prepares a disk to receive data from an Electronic Arts home management program. This command may be used without disturbing whatever is in memory at the time. **IMPORTANT!** *This command erases everything already on the disk before formatting it.*

■ **Load** – loads the selected recipe into the computer's memory.

■ **Delete** – removes a saved recipe from your document disk.

■ **Rename** – lets you give a new name to a previously saved recipe.

■ **Copy-Disk** – lets you make a back-up copy of a document disk after first asking you to choose the disk drive arrangement you'll use for the process. It's a good idea to put a write-protect tab on the disk you're copying from before using this command.

■ **Drive2** – lets you tell your computer to use your second disk drive if you have one. When you use this command, it will be replaced in the menu by Drive1. Use Drive1 when you want to switch back to disk drive number 1.

■ **Stop** – when the Cookbook is computing results or printing them out, pressing Return will cause the activity to stop. If stopped before computation is complete, the message "stopped, partial results" will appear on the screen to warn you that the results shown may be incorrect relative to the inputs in the recipe.

■ **Quit** – erases whatever is in memory and returned you to the point where the program asks you to select index or insert a document disk.

## ERROR MESSAGES

Occasionally the computer will encounter some difficulty when trying to carry out the command you asked for. When that happens, you will hear a beep tone and a message describing the difficulty will appear either on the top line of the screen or within an answer or table.

### MESSAGES WHICH APPEAR WITHIN ANSWERS AND TABLES

**1. Stopped Partial Results** – this message appears when you press Return before the Cookbook has finished its computations. You should be very suspicious of the accuracy of such results.

**2. Overflow Don't Trust These Results** – this message appears when the numbers the Cookbook is working with become impossibly large. You should be very suspicious of the accuracy of such results. They are probably meaningless.

### MESSAGES WHICH APPEAR AT THE TOP OF THE SCREEN

**1. Printer Operation Error** – If you get this message, check to make sure that your printer is turned on, that it's connected to your computer and that its select light is on.

**2. Disk Operation Error** – This message says that there's a problem either with the disk media itself or with the disk drive. Check to make sure you haven't left your drive door open.

**3. Sorry, Can't Handle Those Inputs** – This message appears when you try to enter numbers that the Cookbook cannot sensibly use, given the equations it must work with.

**4. Other Messages** – The other possible messages deal with mistakes you can make in working with your document disks – trying to give a name already in use to a new recipe you're trying to save, trying to save a recipe without filling in a name, etc. In all cases you will be able to recover from the problem without losing any work.

# Thinking with Financial Cookbook — a Short Tutorial

## FIVE STEPS TO FINDING BASIC ANSWERS

Financial Cookbook has been designed to make answering basic questions — what will my payments be, how much will I have, how long will it last, etc. — dazzlingly easy.

**Step 1.** State Your Problem — For example, how much would I have in 5 years if I started putting \$50 a month in a savings account?

**Step 2.** Scan the Index for a Recipe that Sounds Promising — This one's easy this time. "Monthly Savings Deposits" sounds exactly right.

**Step 3.** Get the Recipe and Study It — Move the highlight over the recipe name you want and press Return. Then look to see what numbers the recipe asks for and what it promises to deliver, and decide if it's the one you want.

**Step 4.** Enter Your Data and Use Compute — Try it. Put in 50 next to "Monthly deposit", 5 for "Number of years", and the interest rate your bank pays on savings for "Interest rate earned". Then select and use the Compute command. (Compounding periods is automatically filled in with 365 — the number used by most banks for passbook savings. Don't worry for now about Marginal tax rate and Inflation rate. We'll talk about them in the next section of this tutorial.)

### 3 Monthly Savings Deposits

Finds what regular monthly savings deposits earn over time

Monthly deposit	\$ 50
Number of years	5
Interest rate earned	% 5.75
Compounding periods	365
Marginal tax rate	% 0
Inflation rate	% 0

Interest earned .....	\$ 467
Taxes paid .....	\$ 0
Balance after taxes .....	\$ 3467
Adjusted for inflation .....	\$ 3467

YR	INTEREST	TAX PD	BALANCE	BUY PWR
1	\$ 16	\$ 0	\$ 616	\$ 616
2	\$ 53	\$ 0	\$ 1269	\$ 1269
3	\$ 91	\$ 0	\$ 1960	\$ 1960
4	\$ 132	\$ 0	\$ 2692	\$ 2692
5	\$ 175	\$ 0	\$ 3467	\$ 3467
TOT	\$ 467	\$ 0	\$ 3467	\$ 3467

**Step 5.** Look at the Results, Study the Table — Your computer will fill in a table and then summarize with an answer or, as in this case, a group of related answers. The table itself shows where those results came from, year by year. Study it if the answers surprise you, or if you want to think in more detail about how the numbers change as time passes. (See the reference card if you don't know how to scroll forward and backward to see the parts of the recipe not on the screen at any given time.)

**What If.** There's really a sixth step too. Most of the time you'll find yourself thinking something like, "Gee, I wonder what would happen if I changed that interest rate." And since finding out is as easy as changing a number and using Compute again, you'll try it. And you'll try it again with

still another number. And with every try, your feel for how money works will deepen.

## ADDING IN INFLATION AND TAXES

Ignoring the effects of taxes and inflation on your money is like ignoring the effects of friction on tires: it may make problems easier to work but it doesn't really tell you what you need to know. With Financial Cookbook, the problems are suddenly easier to work with taxes and inflation included.

**Monthly Savings Revisited** — Since most of us don't take money from our savings accounts to pay taxes on the interest we earned, we forget to consider the effects of taxes on what we're earning. And indeed, the effect doesn't matter as long as we're not paying the taxes from the account and all we're interested in is how much cash we would have in the bank at some future point. But if we want to know how much we're really earning — so we can compare it with another investment perhaps — then the taxes matter very much.

And suppose the reason for our savings plan is some particular thing we want to buy — a dream vacation, maybe. What we're really interested in is not how much cash we'll have, but how much buying power. We know that the price of our dreams is probably going to rise while we're saving our money, and we want to know whether we'll have enough when the time comes.

**The Effects of Inflation and Taxes on Savings** — If we're saving for a vacation and believe that the cost of air fare, etc. is going to go up about 4% every year, we should enter 4 next to Inflation in the monthly savings recipe, and we should shift our attention to the "adjusted for inflation" part of the answer summary and the Buying Power column in the table. That's where the Cookbook tells us how much the money we'll have in five years would buy if we had it right now, (given the inflation rate we're projecting). So in this case, if the vacation costs \$2800 now, and we're right about inflation, and that's the best interest rate we can get, we're just barely going to make it.

### 3 Monthly Savings Deposits

Finds what regular monthly savings deposits earn over time

Monthly deposit	\$ 50
Number of years	5
Interest rate earned	% 5.75
Compounding periods	365
Marginal tax rate	% 0
Inflation rate	% 4
Interest earned	\$ 467
Taxes paid	\$ 0
Balance after taxes	\$ 3467
Adjusted for inflation	\$ 2850

YR	INTEREST	TAX PD	BALANCE	BUY PWR
1	\$ 16	\$ 0	\$ 616	\$ 592
2	\$ 53	\$ 0	\$ 1269	\$ 1173
3	\$ 91	\$ 0	\$ 1960	\$ 1742
4	\$ 132	\$ 0	\$ 2692	\$ 2301
5	\$ 175	\$ 0	\$ 3467	\$ 2850
TOT	\$ 467	\$ 0	\$ 3467	\$ 2850

And if we have to take taxes out of the account as we go along, things can get even worse. It depends on what's called "marginal tax rate" — the tax rate that will apply to the next dollar we earn given the taxes we're already paying. If our marginal tax rate is 30%, then 30 cents of the next dollar we earn from interest on our account is going to the government. (For help in figuring your own marginal rate, get out your most recent tax record, get recipe number 1 onto your screen and turn to page 8.)

If we apply the 30% rate to our vacation problem, we find that we're going to come up short. The tax and inflation bite is just too big. To find out how much we would need to save each month to pay for that vacation in light of taxes and inflation, we could now do a little trial and error work with the monthly savings recipe we've been using. Or we could solve the problem even faster by going to a different recipe, in this case "Monthly Deposit For Future Purchase". With that recipe, we can enter the price the vacation of our dreams is selling for now and our estimate of the inflation rate, and the recipe will tell us how much we need to put away each month to meet the buying power target in the allotted time.

### 5 Monthly Deposit for Future Purchase

Finds monthly deposit required to obtain specified future buying power

Buying power you want	\$ 2800			
Number of years	5			
Inflation rate	% 4			
Interest rate earned	% 5.75			
Compounding periods	365			
Marginal tax rate	% 30			
Monthly deposit	\$ 51			
Interest paid	\$ 470			
Taxes paid	\$ 141			
Balance after taxes	\$ 3407			
Adjusted for inflation	\$ 2800			
YR	INTEREST	TAX PD	BALANCE	BUY PWR
1	\$ 17	\$ 5	\$ 627	\$ 603
2	\$ 54	\$ 16	\$ 1280	\$ 1184
3	\$ 92	\$ 28	\$ 1961	\$ 1743
4	\$ 133	\$ 40	\$ 2669	\$ 2281
5	\$ 174	\$ 52	\$ 3407	\$ 2800
TOT	\$ 470	\$ 141	\$ 3407	\$ 2800

## BEING CAREFUL ABOUT YOUR INFLATION AND TAX SETTINGS

Almost all of the recipes in Financial Cookbook give you the advantage of being able to include or ignore the effects of taxes and inflation. What you decide to do for any particular problem should depend on the nature of the question you're trying to answer.

Setting Marginal tax rate to 0 is the right thing to do if you're trying to figure out how much money will actually be in a savings account in the future if you pay any taxes due on the interest from some other source. But if you're trying to compare one investment with another, then you should by all means include taxes in your calculations.

Similarly, if you're trying to accumulate a certain amount of cash in

the future, you can set Inflation to 0. But if your goal is the ability to buy something which may have an inflated price in the future, then buying power is what you should be interested in and you'll need to make an estimate of the inflation rate you think will apply. It's important to remember, though, that estimating is what you're doing and that the farther in the future you project your calculations, the more cautiously you should interpret your results. Financial Cookbook is a thinking/planning tool, not a crystal ball.

## USING THE CONCEPT OF PRESENT VALUE

Would you rather have \$100 today or \$110 next year? Comparing investments or expenditures is not always as easy as simply making sure you've considered the effects of taxation. Because different opportunities can involve different amounts, different interest rates and different timing, it's hard to find a common ground on which to compare them. One such common ground is that created by the concept of "present value".

The notion of present value draws its strength from one fundamental comparison between money we have today and money due us in the future. Money we have today can be put to work immediately. It can be invested in a savings account or property or stocks, etc., and will begin at once to grow at some interest rate earned or rate of return. Money due us in the future cannot be put to work until we get it. Thus the value of money depends on when in time we actually have it. And if we want to make a fair comparison of investments or expen-

ditures, we must make sure that we have included the effects of time in our calculations.

### NO TIME LIKE THE PRESENT

One way to include the effects of time is to assume that any amount in the future can be converted into a "present value" by reducing its size and importance at a rate equivalent to the annual rate of return we could get on the funds if we had them now. The resulting amount, or present value, could theoretically be invested at the "interest rate earned" and grow into the future amount indicated. If we think we can earn 10% on our money and don't have to pay any taxes on our earnings, then the present value of \$110 due one year in the future is \$100. That's because \$100 plus the 10% of \$100 we expect to earn — \$10 — equals \$110.

When you use a recipe involving present value, the recipe is attempting to take all of the payments and receipts and when they happen, including tax effects, and turn the entire set of numbers into one number — the present value. This present value is the amount of money that you could have today which, considering the interest rate earned you put into the recipe, is the same equivalent amount as the sum of all of the effects of the payments and receipts in the problem.

The tables below show a present value computation made with recipe 11 and confirming computation made with recipe 2. In the first table, the question "what's the present value of \$1000 due in two years" is answered "\$868, if you can earn 10% on your money and have a 30% marginal tax rate." In the second table the question "how much will \$868 earn in two

years" is answered "\$1000, if you can earn 10% on your money and have a 30% marginal tax rate." Both say in different ways that \$868 today and \$1000 two years from now are equivalent, given the time value of money and the assumptions made about interest rate earned and marginal tax rate.

#### 11 A Single Payment's Present Value

Finds the present value of a future amount

Future amount	\$ 1000
Years until payoff	2
Interest rate earned	% 10
Compounding periods	365
Marginal tax rate	% 30

Present value ..... \$ 868  
(equivalent amount today)

Interest earned ..... \$ 189  
Taxes paid ..... \$ 57  
Balance after taxes ..... \$ 1000

YR	INTEREST	TAX PD	BALANCE
1	\$ 91	\$ 27	\$ 931
2	\$ 98	\$ 29	\$ 1000
TOT	\$ 189	\$ 57	\$ 1000

#### 2 Single Savings Deposits

Finds what a deposit in a savings account earns over time

Amount of deposit	\$ 868
Number of years	2
Interest rate earned	% 10
Compounding periods	365
Marginal tax rate	% 30
Inflation rate	% 0

Interest earned ..... \$ 189  
Taxes paid ..... \$ 57  
Balance after taxes ..... \$ 1000  
Adjusted for inflation ..... \$ 1000

YR	INTEREST	TAX PD	BALANCE	BUY PWR
1	\$ 91	\$ 27	\$ 932	\$ 932
2	\$ 98	\$ 29	\$ 1000	\$ 1000
TOT	\$ 189	\$ 57	\$ 1000	\$ 1000

## HOW RECIPES 10, 11 AND 12 USE PRESENT VALUE

Recipes 11 and 12 deal most directly with the concept of present value. Recipe 11 finds the present value of a single future amount. Recipe 12 finds the present value of a series of future monthly payments. You can get a feel for how it works by trying out different interest and tax rates on the question "Which prize is better: \$100,000 now or \$1000 a month for 20 years?"

Recipe 10 adds a new twist. It lets us deal with situations where we know both present and future value and need to know what rate of return describes the relationship between them. An example might go as follows: We can invest \$1000 now in a land deal that promises to pay \$1500 in two years. We think we know how risky the deal is in relation to the safety of a savings account. We'd like to know how it compares numerically.

Our problem is made more complicated by tax considerations. Interest on the savings account is taxed as ordinary income, while the gain on the investment may qualify for long term capital gains treatment. (According to federal law as of this writing, only 40% of the gain from the sale of property held for at least one year is taxable.) Recipe 10 considers this difference in taxation, if we tell it to, when it figures out what savings interest rate would produce the same result as our speculative venture. To get a feel for how Recipe 10 works, keep the present and future amounts constant, then try different marginal tax rates and switch between yes and no in answer to the capital gains question.

## HOW RECIPES 25, 27, 28, 31 AND 32 USE PRESENT VALUE

In each of these recipes, future expenditures of money are expressed in terms of present value so that comparisons can be made. Recipe 25 compares the costs of continuing an old mortgage with all the costs — including penalties, points and closing costs — of taking out a new one. The best approach is the one whose expenses produce the lowest present value.

Recipe 27 uses present value to compare all the regular monthly costs of renting with the more complex costs of buying a house. If the present value of the rental costs is higher, it recommends that you buy. Recipe 28 compares the up-front cost in installing an energy saving device with the present value of the fuel bill savings you expect. If the present value is positive when the device costs are subtracted, the device is a good financial investment.

Recipes 31 and 32 produce present value figures which summarize the costs of automobile buying and leasing. Once you've picked the car you'd like, these recipes let you enter the financial details and compare your lease versus buy options. Whichever option has the lowest real cost in present value is the better financial deal.

## TAXES AND PRESENT VALUE CALCULATIONS

In recipes 10, 11, 12, 25 and 27, the tax payments are assumed to be made in a transaction at the end of the year in which earnings occurred. In recipes 28, 31 and 32, the calculations are handled as though taxes were being paid each month.

# Recipe Notes

## 1 Understanding Your Marginal Tax Rate

How much you really earn from a particular investment depends partly on how much of your earnings must go toward taxes. And how much a loan really costs you depends partly on how much the interest you pay saves you at tax time. To help you think about such matters, Financial Cookbook needs a number to use to calculate the tax implications of your investments and expenditures.

The number Financial Cookbook uses is called marginal tax rate. It assumes that any given investment you're contemplating will produce income above and beyond whatever you're currently paying taxes on. So if you want to know what tax bite to allow for, you must use the one that would apply to additional income beyond what you're already paying taxes on.

### ENTRIES

■ **Taxable income last year** – put in the number from the "taxable income" line of your federal income tax return (Form 1040, line 37 for 1983 returns).

■ **Federal tax paid last year** – put in the number from the "Total tax" line of your federal income tax return (Form 1040, line 56 for 1983 returns).

■ **State tax paid last year** – put in the number from your state income tax return which corresponds to the "total tax" line in the federal form.

■ **Federal marginal tax rate** – turn to the tax rate tables or schedule you used to calculate your tax. Look to see how much tax you would owe if your taxable income were larger. If you're using a schedule, the percentage shown that would apply to your larger income is the figure to put here. If you're using a table, divide the difference between the taxes by the difference between the incomes to determine the percentage figure you're looking for.

■ **State marginal tax rate** – use your state tax forms, follow the same procedure as for federal marginal tax rate.

■ **Do you itemize?** – answer yes or no. The Cookbook needs to know because state taxes are deductible from federal taxable income, and it must take that into account when computing your combined marginal tax rate. (Note: The program does NOT contain built-in tax tables.)

### ANSWER AND TABLE

■ **Actual tax % last year** – the sum of the numbers you entered for federal and state taxes divided by the number you entered for taxable income.

■ **If you earn \$100 extra** – a table to show the impact of the marginal tax rates you entered.

■ **Marginal tax rate** – a figure which combines the effect of your state and federal marginal tax rates. If you don't itemize deductions, the two are simply added. If you do itemize, the fact that state tax is deductible on the federal form is taken into account in the computation.

*NOTE: If you want the figures you find and compute with this recipe to be automatically inserted into other recipes whenever they are called for, use the Profile command, enter the marginal tax rate numbers and use the Save-Profile command.*

## 2 Single Savings Deposits

Shows how a single deposit in an interest bearing account grows over time.

### ENTRIES

■ **Amount of deposit** – amount you plan to deposit in the account now.

■ **Number of years** – number of years you plan to leave deposit in the account.

■ **Interest rate earned** – annual interest rate applied to your deposit in return for the use of your money.

■ **Compounding periods** – number of times each year that interest is computed and added immediately to the balance in the account; most banks compound regular passbook savings accounts daily – i.e., 365 compounding periods per year.

■ **Marginal tax rate** – tax rate that will apply to the next dollar you earn; set equal to 0 if you don't plan to pay taxes from the account.

■ **Inflation rate** – the percentage you think prices will increase each year for the period you want to analyze; set to 0 if you don't want to consider the effects of inflation on the buying power of your account balance.

## ANSWER SUMMARY

- **Interest earned** – total interest earned for the period analyzed.
- **Taxes paid** – total taxes paid from the account for the period analyzed.
- **Balance after taxes** – amount in the account at the end of the period analyzed, assuming taxes, if any, were paid from the account.
- **Adjusted for inflation** – given your inflation rate assumption, the amount of buying power represented by the “Balance after taxes” line above. (Amount of deposit, plus interest earned, minus taxes paid, equals balance.)

## TABLE

- **Yr** – the year being analyzed
- **Interest** – amount of interest earned during the year.
- **Tax pd** – amount of tax paid (on the interest earned) from the account during the year (If you don't want taxes taken from the account, set the marginal tax rate entry to 0.)
- **Balance** – amount in the account at the end of the year (previous year's balance, plus this year's interest earnings, minus this year's taxes).
- **Buy pwr** – amount of buying power (given your inflation rate assumption) represented by the account balance at the end of the year.

## 3 Monthly Savings Deposits

Shows how regular monthly deposits in an interest bearing account will grow over time.

- **Monthly deposit** – the amount you plan to deposit in the account each month.

For information about all other entry and answer lines, see the notes for recipe 2 above.

## 4 Deposit Needed for Future Purpose

Lets you put in how much you need and when you need it and then tells you how much you would have to invest now to reach your goal.

- **The first line in the entry list** – amount needed – asks for the amount of buying power you want to have at the end of the time you specify. (If you don't want to consider the effects of inflation – i.e., if it's a target amount of cash you want instead of a target amount of inflation adjusted buying power – set Inflation rate to 0.)

- **The first line in the answer summary** – amount you must deposit – tells how much you must deposit now to reach the buying power goal you specified.

For information about all other entry and answer lines, see the notes for recipe 2 above.

## 5 Monthly Deposit for Future Purpose

Exactly like recipe 4, except it tells how much you must now begin depositing each month (instead of all at once) to have the target amount of buying power you want in the future. Again, if you're interested in cash and not inflation adjusted buying power, set Inflation rate to 0.

## 6 Living on Your Savings

Lets you put in how much you have in your account and how much buying power you would like to withdraw each month, and tells you how long your account will last.

- **Initial savings balance** – amount you have or will have in your account when you want to start the withdrawals

- **Monthly withdrawal** – amount of inflation adjusted buying power you want to withdraw each month (If you don't want your monthly withdrawal to be increased each year to keep pace with an inflation rate, set inflation rate to 0.)

The first item in the answer summary tells you how long your account will last. For information about the other entry and answer lines, see the notes for recipe 2 above.

Total withdrawn plus taxes paid equals initial savings balance plus interest earned. Tax payments are deducted from the balance each year in a transaction separate from the monthly withdrawal in question.

## TABLE

- **Yr** – the year being analyzed.
- **Monthly withdrawal** – amount of cash withdrawn from the account each month for the year.
- **Yearly withdrawal** – amount of cash withdrawn from the account during the year.

■ **Taxes due** – the amount of taxes due on the interest the account earned for the year.

■ **Balance** – amount of cash left in the account at the end of the year (previous year's balance minus this year's withdrawal plus the interest earned by the account this year minus the taxes due on that interest).

## 7 Making Your Savings Last Forever

Tells you how much you could withdraw from your account each month without changing the balance.

■ **Initial savings balance** – amount you have or will have in your account when you want to start the withdrawals. (For information about the other entry and answer lines, see the notes for recipe 2 on page 8.)

## TABLE

■ **The first line** tells how much you can withdraw each month and how much that would come to each year.

■ **The second line** tells how much tax you would owe on the interest earned by the account each month and how much that would come to each year.

■ **The last line** shows the result of subtracting the taxes owed from the withdrawal so you can see how much you would have left to spend each month after allowing for the taxes owed on the interest the account is earning. Taxes are assumed to be paid from the withdrawal, not from the account.

## 8 Earning Interest with Treasury Bills

Lets you quickly figure your profit and rate of return on a standard investment in treasury bills.

### ENTRIES

■ **Purchase price** – amount you must pay for the T-bills you plan to buy.

■ **Redemption price** – amount you will receive when you cash in your T-bill purchase (see "redemption price" in the glossary).

■ **Service charges** – any fees you must pay to the individual or institution you are purchasing the T-bills from.

■ **Days held** – number of days after purchase until you can cash in your T-bill purchase.

■ **Federal marginal tax rate** – use federal rate only; see notes for recipe 1.

### ANSWER TABLE

■ **Pre-tax gain** – redemption price minus purchase price and service charges.

■ **After-tax gain** – pre-tax gain minus federal taxes owed on the amount of the gain. (Treasury bills are exempt from state income taxes.)

■ **Profit** – another word for gain.

■ **Rate of return** – amount of gain expressed as the annual percentage change in the investment value needed to produce that gain.

## 9 Earning with Long Term Investments

Lets you analyze profit and rate of return on investments which qualify for long term capital gains treatment. As of March 1, 1984, profits were subject to federal long term capital gains treatment if they resulted from the sale of property (land, art objects, collectibles, stocks, partnership interest, etc.) held for at least one year prior to sale.

### ENTRIES

■ **Purchase price** – amount you paid for the property when you bought it, including expenses of purchase.

■ **Estimated resale value** – amount you expect to receive when you sell the property (less expenses of sale).

■ **Years until sale** – number of years you expect to hold the property before selling it; must be a whole number (not a decimal) greater than 1.

■ **Capital gains rate** – percentage of the gain from the sale that will be subject to taxes. (As of March 1, 1984, 40% of the gain was subject to tax under federal laws. Not all state laws are exactly like the federal law. If you're concerned that you live in one of those states and want to refine the figure to fit your situation, consult with an expert about what percentage you should use instead.)

■ **Marginal tax rate** – the tax rate that applies to amount of the gain subject to taxes.

## ANSWER TABLE

- **Pre-tax gain** – estimated resale value minus purchase price.
- **After-tax gain** – pre-tax gain – taxes on the gain (capital gains rate x marginal tax rate x pre-tax gain).
- **Profit** – another word for gain.

- **Rate of return** – amount of gain expressed as the annual percentage change in the investment value needed to produce that gain.

## 10 Finding Equivalent Interest Rates

Given an investment in which you put in a sum of money now and get back a larger sum in a single payment at some point in the future, this recipe tells you what interest rate you would have to earn to produce the same profit in the same period of time with a savings account or other similar investment.

### ENTRIES

- **Amount of deposit** – amount you are investing now.
- **Expected future value** – amount you expect to receive when the investment pays off.
- **Number of years** – number of years until you expect the investment to pay off.
- **Marginal tax rate** – rate at which the profit from your investment will be taxed.
- **Capital gain (y/n)** – answer yes if the investment will qualify for capital gains treatment (see recipe 9 above).

## ANSWERS

■ **Equivalent interest rate** – the interest rate you would have to get on an interest bearing account to produce the same profit in the same period of time.

■ **Pre-tax gain** – the amount of gain from your investment before taxes are paid.

■ **Taxes on gain** – amount you would owe in taxes on the gain from the investment.

■ **After-tax gain** – pre-tax gain minus taxes on gain

## 11 A Single Payment's Present Value

Finds the present value of a future amount (see page 6 for a discussion of the concept of present value).

## ANSWERS

■ **Future amount** – the amount – either expense or income – you expect in the future.

■ **Years until payoff** – number of years until you will receive or have to spend the future amount.

■ **Interest rate earned** – the interest rate you could get if you had the money to invest now.

■ **Compounding periods** – the number of times per year that interest will be computed and added to the account balance (in the account you could put the money in if you had it now).

■ **Marginal tax rate** – the rate at which the interest your account would earn would be taxed.

## ANSWERS

■ **Present value** – the amount you would need to invest today in order to produce the future amount you are interested in.

■ **Interest earned** – the amount of interest your account would have earned during the period being analyzed.

■ **Taxes paid** – the taxes you would have had to pay on the interest earnings (taxes are assumed to have been paid from the account).

■ **Balance after taxes** – amount that would be in your account at the end of the period being analyzed; same as the future value you are interested in.

The table spells out how the theoretical account would behave each year for the period being analyzed.

## 12 Monthly Payment's Present Value

Finds the present value of a series of monthly payments you expect to receive or make.

The entries and answers for this recipe are just like the ones for recipe 11, except that the first entry asks for the size of the monthly payment you expect to receive or make instead of for a lump sum payment. There is no table to accompany the answer summary.

## **13 Saving Money with IRAs**

Compares an IRA savings account with a regular savings account. (IRA stands for Individual Retirement Account. Since the money you deposit in an IRA is not subject to taxation until you withdraw it, the balance you begin earning interest on is immediately larger than if you had to pay taxes before investing.)

### **ENTRIES**

- **Amount of deposit** – amount you plan to deposit in an IRA.
- **Years to analyze** – number of years' worth of comparison you want to look at.
- **Interest rate earned** – annual interest rate your money will earn.

### **ANSWER SUMMARY AND TABLE**

- **Ending savings balance** – amount you would have in a savings account at the end of the period analyzed if you paid tax on "amount of deposit" before you invested it and paid taxes due on the interest earned each year from the account.
- **Ending IRA balance** – amount you would have in an IRA at the end of the same period. (Since IRA deposits and interest earned by an IRA are not subject to taxes until withdrawal, this amount equals the full amount of the initial deposit plus all the interest earned during the period analyzed.)
- **The first line in the table**, labeled NOW, shows the situation at the time the deposit is made. The first column shows the amount of interest earned (0, since the money is only now being

deposited). The second column shows how much tax would be due if the amount were not being deposited in a tax sheltered IRA ("amount of deposit" times "marginal tax rate"). Third column shows how much the balance would be in an account not sheltered from taxes ("amount of deposit" minus "tax due"). The last column shows what the balance would be if the money were deposited in an IRA (same as "amount of deposit" since no taxes are due on an IRA until the money is withdrawn).

■ **Each additional line** shows the situation for another year. "Interest" is the amount of interest earned during the year regardless of whether the money is in a savings account or an IRA. "Tax due" is the tax that would be due on the interest if the money were in a savings account. "Non IRA balance" is the previous year's non IRA balance plus the interest earned minus the taxes due. "IRA balance" is the previous year's balance plus the interest earned during the year.

## **14 An IRA's Future Value**

Shows what a regular annual IRA savings program will produce over time.

### **ENTRIES**

- **Yearly deposit** – amount you plan to put in your IRA each year.
- **Years to analyze** – number of years you plan to make the annual contribution.
- **Initial IRA balance** – amount already in your IRA now.

### **ANSWER AND TABLE**

- **Balance at end of period analyzed** – total of the deposits plus the interest earned by the account.
- **Deposited** – sum of initial IRA balance plus all annual deposits to date.
- **Balance** – previous year's balance plus interest earned by the account during the year.
- **Buy pwr** – the inflation adjusted buying power (given today's dollar) of the account balance.

## **15 Living From an IRA**

Shows how long your IRA will last if you withdraw the same amount of inflation adjusted buying power each month.

### **ENTRIES**

- **Initial IRA balance** – amount you expect to have in your account when withdrawals start. (*NOTE: If you withdraw from an IRA before reaching the age of 59 1/2, your withdrawal is subject to a penalty as well as to taxes. See recipe 16.*)

■ **Monthly withdrawal** – inflation adjusted buying power amount you want to withdraw each month. (If you don't want the size of your monthly withdrawal to be increased each year to keep pace with an inflation rate, enter 0 for inflation rate.)

- **Tax rate at retirement** – tax rate you expect to pay when you begin withdrawing money upon retirement; applies only to amount of withdrawal as the interest earned by the account is still not subject to taxes until it is withdrawn. (To come up with a figure

for this entry, estimate your annual post retirement income – including the amount you are withdrawing from your IRA – and consult a financial advisor and/or the tax tables you used to arrive at your marginal tax rate for Recipe 1.)

## ANSWER SUMMARY

■ **Total withdrawn** – total amount withdrawn before account ran out of funds.

■ **Interest earned** – total amount of interest earned from the time withdrawals started until account ran out of funds. (Taxes are due on that interest only when the money is withdrawn.)

■ **Taxes paid** – total amount of taxes paid on the withdrawals.

(Initial IRA balance plus interest earned equals total withdrawn. Taxes are assumed to have been paid from the withdrawals.)

## TABLE

■ **Monthly withdrawal** – amount of money being withdrawn each month. (If you don't want this amount to be increased annually to keep pace with an inflation rate, set inflation rate to 0).

■ **Pre-tax withdrawal** – total amount withdrawn during the year.

■ **Aft-tax withdrawal** – total amount withdrawn during the year minus the total amount of taxes due on the withdrawal.

■ **Balance** – last year's balance plus the interest earned this year minus this year's withdrawals.

## 16 Early Withdrawals from an IRA

Lets you determine how much you would have left after paying taxes and the early withdrawal penalty if you withdraw money from an IRA before reaching the age of 59 1/2.

## ENTRIES

■ **Initial IRA balance** – the amount in your account when you want to make your withdrawals.

■ **Amount you need** – sum you want to have left to spend after paying taxes and the early withdrawal penalty.

■ **Marginal tax rate** – tax rate which will apply to money you withdraw.

## ANSWER SUMMARY

■ **Amount you must withdraw** – amount you must take out to cover taxes and early withdrawal penalty and still have the spendable cash you want.

■ **Penalty** – 10% of the amount you take out. (As of March 1, 1984, early withdrawals from an IRA were subject to a 10% penalty on the amount withdrawn.)

■ **Income tax** – amount of tax you would owe (marginal tax rate times amount withdrawn).

■ **Amount left to spend** – amount withdrawn minus penalty minus income tax.

■ **Ending IRA balance** – initial IRA balance minus amount you must withdraw.

*NOTE: To discover the effect of completely closing out your IRA before you reach 59 1/2, try different amounts for "amount you*

*need" until you find the one that leaves an ending balance as close to 0 as you can get it.*

## 17 How Much Life Insurance You Need

Tells how much life insurance you need to provide replacement buying power for some number of years after your death. In essence, life insurance provides an investible amount which would produce a constant amount of inflation adjusted monthly buying power for a specific period of time.

## ENTRIES

■ **Monthly buying power** – amount of cash you want your beneficiaries to have monthly for the first year after year death.

■ **Years to receive income** – number of years you want beneficiaries to have monthly income from the invested proceeds from your life insurance policy.

■ **Interest rate earned** – interest you expect your beneficiaries to be able to earn when they invest the proceeds from the policy.

■ **Inflation rate** – percentage you want the monthly payment to increase by each year so that the buying power of the monthly withdrawal will keep pace with inflation. (If you don't want the amount of the monthly withdrawal to increase each year, set inflation rate to 0.)

■ **Marginal tax rate** – percentage of the interest earned by the account each year which must be paid in taxes by your beneficiaries. (Taxes are assumed to be paid from the account in a

transaction separate from the withdrawals in question.)

## ANSWER SUMMARY

■ **Insurance needed** – amount of policy proceeds needed to produce desired amount of inflation adjusted monthly buying power for desired period.

■ **Total withdrawn** – total amount withdrawn for period analyzed (insurance needed plus interest earned).

■ **Interest earned** – total amount of interest earned while proceeds last.

■ **Taxes paid** – total tax due on interest while proceeds last. (Taxes are assumed to be paid from the account in a transaction separate from the withdrawals in question.)

## TABLE

■ **Monthly withdrawal** – amount of money being withdrawn each month. (If you don't want this amount to be increased annually to keep pace with an inflation rate, set inflation rate to 0.)

■ **Yearly withdrawal** – total amount withdrawn during the year.

■ **Taxes due** – amount of taxes due on the interest earned during the year.

■ **Balance** – last year's balance minus this year's withdrawals plus the interest earned this year minus the taxes due on the interest.

## 18 Mortgage Schedule, Yearly

Tells the monthly payment for a mortgage and shows how much of the payment is applied to principal and how much to interest each year.

## ENTRIES

■ **Amount of mortgage** – size of the loan you are taking out in order to buy a house.

■ **Mortgage interest rate** – annual rate used to determine the fee you must pay each month for the use of the mortgage amount you borrowed.

■ **Length of mortgage** – time in years until mortgage will be paid off.

## ANSWER AND TABLE

■ **Monthly payment** – amount you must pay each month.

■ **Yr** – the year being described.

■ **Principal** – the amount of the year's payments applied to paying back the original sum borrowed (the "principal").

■ **Interest** – the amount of the year's payments that went for the rental fee on the borrowed money (the "interest").

■ **Balance** – the amount of principal still owed at the end of the year.

*NOTE: The amount of interest you pay in each monthly payment is equal to 1/12 of the mortgage interest rate times the balance due on the loan.*

## 19 Mortgage Schedule, Monthly

Shows how your mortgage payments break down between interest and principal for each month of any given year.

■ **Year to review** – the particular year of the mortgage you want to study.

For additional information see the notes on recipe 18 above.

## 20 Variable Rate and Payment Mortgages

Shows how changes of up to 5% in the interest rate affects the payment on a variable interest, variable payment mortgage.

Entries called for are the same as those described for recipe 18.

The answer summary shows the payment for the mortgage interest rate you entered and for rates 5% higher and 5% lower than the one you entered.

The table shows the payment for all the quarter of a percent steps between the low and high numbers in the answer summary.

## 21 Variable Rate, Fixed Payment Mortgages

Shows how changes of up to 5% in the interest rate affect the payment distribution between interest and principal for a variable rate, fixed payment mortgage.

In addition to the entries described above in the notes for recipe 18, this recipe asks for the current balance owing on your mortgage. The answer summary shows how a payment distributes between interest and principal for the mortgage interest rate

you entered and for rates 5% higher and 5% lower than the one you entered. The table shows the payment for all the quarter of a percent steps between the low and high numbers in the answer summary.

Negative numbers mean that the payment was not sufficiently large to cover all the interest due. In those situations, the amount of principal you owe is increased by the amount of the shortfall represented by the negative number.

## 22 Interest Only Second Mortgages

Lets you find the combined monthly payment for a first mortgage on which you make a fully amortized monthly payment plus a second mortgage on which you pay only the interest due each month.

### ENTRIES

This recipe is made up of two sets of entries like those described for recipe 18.

**For the first group**, put in the information for your fully amortized mortgage ("fully amortized" means that the loan will be completely paid off when you make your last payment).

**For the second group**, put in the information for the loan on which your payment will only cover the interest. (If you only want to know the payment for an interest only loan, set all the entries for the first group to 0.) The recipe assumes that both loans are being taken out at the same time.

## ANSWER SUMMARY AND TABLE

The first three answers show the monthly payment for each loan and the combined monthly payment. The fourth answer shows how much you will still owe on the first mortgage when the interest only loan is due. You will also of course still owe all of the principal on the interest only loan at that time as well. The payments and balances in the table are for the two loans together.

## 23 Mortgages with Balloons

Shows the monthly payment and amount of the balloon payment for a loan which is due sooner than the monthly payments will pay it off.

**Fill in the first three entries exactly as you would for the ordinary mortgage described in the notes for recipe 18.** Fill in "Year balloon is due" with the year in which you must pay off the loan in full by making one large final payment to cover all the remaining balance owed at that time.

**The answer summary** shows the size of your monthly payment and the size of the large final payment you must make when the loan is due.

**The table** spells out how much of the payment went toward interest and how much toward principal for each year of the mortgage.

## 24 A Loan's Interest Rate

If you know the size and length (in years) of a loan and the monthly payment, tells what the interest rate is. Can also be used to find the combined interest rate for several loans which have the same length in years.

■ **Amount financed** – total amount you are borrowing.

■ **Number of years** – length of loan(s) in years.

■ **Monthly payment** – total amount you must pay each month.

## 25 Refinancing Your Home

Lets you examine the cost of keeping an existing loan compared with the cost of taking out a new one. Both sets of costs are expressed as present value figures for the purpose of making the comparison. (See the discussion of the concept of present value on page 6.)

### ENTRIES

■ **Original mortgage amount** – amount you borrowed when you took out the existing loan.

■ **Length of mortgage** – original length in years of the existing loan.

■ **Mortgage interest rate** – interest rate on the existing loan.

■ **Years paid on loan** – number of years you've already made the payments on the existing loan.

■ **Payoff penalty** – any penalty amount you must pay for paying off the existing loan before it's due.

■ **Amount of new loan** – amount you can borrow with the new loan.

- Length of mortgage – length in years of the new loan.
- Mortgage interest rate – interest rate on the new loan.
- Points paid – any loan fee for the new loan expressed as “points” which you must pay. (A point is 1% of the loan amount, so 1 point on a \$100,000 loan would be \$1000.)
- Other closing costs – any additional fees (title insurance, etc.) which must be paid in order to get the new loan.
- Years to analyze – number of years over which you would like to compare the effects of keeping the old loan or taking out a new one.
- Estimated resale value – amount you would expect to be able to sell the house for at the end of the period you are analyzing.
- Interest rate earned, compounding periods and marginal tax rate – all used in the present value calculation (see page 6 for an explanation of the concept of present value.) Marginal tax rate is also used to calculate tax savings resulting from the deductibility of interest payments.

## ANSWER SUMMARY

The first line suggests refinancing if the present value of the net expenses for the new loan is smaller than the present value of the net expenses of the existing loan for the period being analyzed.

## ■ Present Loan

**Old mortgage balance** – amount you would need to pay on the present loan.

**Total cash payments** – total of the payments you would make on the present loan during the period being analyzed.

**Total tax savings** – marginal tax rate times the amount of the cash payments that were applied to interest.

**Total expenses, net** – total cash payments minus total tax savings.

**Present value net expenses** – the present value of the total expenses above.

**Present value future equity** – the present value of the resale value - mortgage balance remaining.

**Present value, costs-equity** – the present value of your expenses minus the present value of your profit.

## ■ New Loan

**Cash available from refinance** – amount that would be left after paying off the balance on the old loan plus points and other closing costs.

**The other answer lines** for the new loan are just like the one for the present loan except for the last entry.

**Pres val costs - cash - equity** – present value of the cost of the new loan minus the cash from refinancing minus the present value of the future equity.

## 26 Retiring Your Mortgage Early

Shows how much you would need to add to your monthly payment to pay off your loan sooner than your present payment schedule calls for.

The first three entries are just like those described above for recipe 18.

■ **Years already paid** – number of years you've already been paying on your mortgage.

■ **Years until payoff** – number of years from the time you increase the size of the payment until you want the loan to be paid off.

**The answer summary** shows the present payment and the new larger one required for the loan to be paid off earlier.

**The table** spells out how much of each year's payments go toward principal and how much toward interest.

## 27 Buying or Renting a Home

Lets you compare the costs of buying versus renting by producing a present value figure for each of those options. (For a discussion of the concept of present value, see page 6.) It recommends that you choose the option with the lower present value costs.

## ENTRIES

■ **Annual rent increase** – the percentage you expect the monthly rent you start with to increase each year.

■ **Tax rate, renting** – tax rate you would expect to pay if you are renting and therefore cannot deduct mortgage interest from your income taxes.

■ **Tax rate, buying** – tax rate you would expect to pay if you are buying and itemize you deductions; probably a lower rate than "tax rate, renting" since the generally large amount of interest you pay on your mortgage is deductible and therefore could move you into a lower bracket.

■ **Down payment** – amount of cash you must pay for house in addition to amount you are borrowing.

■ **Amount of mortgage** – amount of purchase price you are borrowing.

■ **Length of mortgage** – number of years until mortgage is paid off.

■ **Annual maint. & insur.** – amount you'll need to spend on insurance and maintenance each year.

■ **Property taxes** – amount you'll have to spend on property taxes each year.

■ **Years until sale** – number of years you expect to keep the house.

■ **Estimated resale value** – amount you expect to be able to get when you sell the house.

■ **Selling costs** – any fees (like agent commissions, etc.) which you will have to pay in connection with the sale of the house (agent commissions have typically been approximately 6% of the selling price).

■ **Interest earned and compounding periods** – used along with appropriate tax rate to compute the present value figures (see page 6 for a discussion of the concept of present value).

■ **Inflation rate** – used to determine how much the annual insurance and maintenance costs and property taxes should be increased for each year analyzed.

## ANSWERS

If the present value of the costs associated with renting is lower than the present value of the costs associated with buying, the program recommends renting. Otherwise it recommends buying.

### ■ First Year Summary

**Cash costs, rent** – total of monthly rent payments for the period analyzed.

**Present value rental costs** – present value of the above total.

**Cash costs, buy** – total of monthly mortgage payment and first year property taxes, insurance and maintenance.

**Tax savings** – "tax rate, buying" times the amount of the first year mortgage payments that went toward interest, plus property taxes.

**Net cash costs** – "cash costs, buy" minus "tax savings".

**Present value purchase costs** – present value of the above total.

### ■ Summary

The first six entries are the same as for the first year summary except that here

they show totals for the entire period being analyzed.

**Present value, sale** – present value of resale value of house, minus selling costs and any outstanding mortgage principal balance.

**Pres value, costs - sale** – the present value of the total costs associated with buying plus the down payment minus the present value of the profit from the sale; result is a net present value figure for costs associated with buying. (If this is a negative number, then you will make a profit on the decision to buy a home – probably due to the high price you assumed you would sell it for.)

## 28 Energy Saving Devices

Lets you look at the financial consequences of making an investment in saving energy.

## ENTRIES

■ **Current monthly fuel bill** – amount you now pay each month for whatever commodity you expect to buy less of as a result of your investment.

■ **Fuel increase rate** – the annual rate of increase in the price of the commodity you expect to buy less of.

■ **Cost to install the device** – amount you must spend to buy and install the energy saving device or material.

■ **Tax credit** – actual dollar amount of the installation cost which you may deduct from your taxes (amount varies from state to state and year to year; consult your tax advisor).

■ **Monthly fuel savings** – cash amount you expect to save each month as a result of your investment.

■ **Years to analyze** – number of years for which you want to consider the effects of your investment.

■ **Interest rate earned, compounding periods and marginal tax rate** – all used for the present value calculation (see page 6 for information about the concept of present value).

## ANSWER SUMMARY

■ **The first line** tells whether your investment paid off financially in the period analyzed.

■ **Present value, energy savings** – the present value of the amount your investment would save you on fuel.

■ **Present value less cost** – the present value of your savings minus the cost to install the device.

## TABLE

■ **Old cost** – annual cost of fuel if the device is not installed.

■ **New cost** – annual cost of fuel if device is installed.

■ **Net saved** – old cost minus new cost.

■ **Pres value** – the present value of net saved.

## 29 Owning Your Car

Shows the total monthly cost of owning a car and expresses those costs as total cost per mile for ease of making comparisons.

### ENTRIES

■ **Purchase price** – amount you paid for the car.

■ **Trade-in value of old car** – if you traded in an old car, amount of trade in credit you got toward purchase.

■ **Amount financed** – amount of purchase price you borrowed.

■ **Length of loan, years** – length of loan you took out to cover amount financed.

■ **Loan interest rate** – annual percentage rate (APR) of interest on your auto loan.

■ **Years until sale** – number of years from the time you bought the car until you plan to sell it.

■ **Car's value when sold** – amount you expect to be able to sell the car for.

■ **Annual maint, ins, fees** – total of the annual cost of maintenance, insurance and license fees.

■ **Miles driven per year** – estimate of the number of miles you drive the car each year.

■ **Miles per gallon** – number of miles you can drive for each gallon of gas you put in.

■ **Interest rate earned, compounding periods, marginal tax rate** – used to figure the interest lost on any down payment you had to

make; marginal tax rate also used to figure tax savings.

## ANSWERS

■ **Monthly payment** – amount of your monthly car payment until loan is paid off

■ **Tax savings** – average monthly tax savings resulting from deductibility of interest. (Actual amount will actually start large and decline over life of loan. Use recipe 19 to see how much of each monthly payment would go toward interest and how much toward principal.)

■ **Interest lost** – interest you could have earned if you had invested your down payment money (if any) instead of buying a car with it.

■ **Maint, ins, fees** – monthly portion of annual maintenance, insurance and licensing fees.

■ **Gasoline** – monthly gasoline costs given the price of gasoline and the mileage your car gets.

■ **Total cash costs** – total of all the above costs.

■ **Cash cost per mile** – total cash costs divided by miles driven per month.

■ **Depreciation** – initial cost of car minus resale value, all divided by the number of months you plan to keep the car ("straight line" depreciation; see "depreciation" in glossary).

■ **Total all costs** – total cash costs plus depreciation.

■ **Total cost per mile** – above total divided by miles driven per month.

## **30 Fixing Your Car**

Shows the total monthly cost of fixing a car you've already finished paying for and expresses those costs as total cost per mile for ease of making comparisons.

### **ENTRIES**

■ **Current car value** – amount you believe you could get for the car if you sold it now.

■ **Cost to repair** – amount you would need to spend to put the car back in working order.

■ **Repair cost financed** – amount of repair costs you need to borrow.

All other entries and all answer lines are just like those for recipe 29. You may use the two recipes together to compare the cost of buying a new car with the cost of repairing the one you have.

## **31 Buying Your Car**

Shows the present value (see page 6 for a discussion of the concept of present value) of the total costs associated with buying a car so that you may compare different car purchase possibilities or, by using the recipe in combination with recipe 32, different car purchase and lease possibilities.

### **ENTRIES**

■ **Purchase price** – amount you must pay for the car.

■ **Amount financed** – amount of purchase price you must borrow.

■ **Length of loan, years** – length of loan you took out to cover amount financed.

■ **Loan interest rate** – interest rate on your loan.

■ **Car's value when sold** – amount you expect to get when you sell the car.

■ **Years until sale** – number of years from time you buy the car until you expect to sell it.

■ **Investment tax credit %** – percentage allowed for investment tax credit on the purchase price of the car; currently 6% (as of March 1, 1984), talk with your financial advisor if you are unsure about this entry.

■ **Business deduction** – percentage of car expenses you may deduct from your income tax as a business expense (talk with your financial advisor if you are unsure about this entry).

■ **Interest rate earned, compounding periods and marginal tax rate** – all used in the present value calculation. (See page 6 for an explanation of the concept of present value.) Marginal tax rate is also used to calculate tax savings.

### **ANSWERS**

■ **Tax credit** – tax credit percentage times the purchase price times the business deduction percentage.

■ **Monthly cash payment** – amount of your monthly loan payment for the amount of the purchase price you financed.

■ **Depreciation tax savings** – amount of depreciation in first month figured according to the ACRS method (see first entry in the glossary); the amount to be depreciated is the

business deductible portion of the purchase price minus 1/2 of the tax credit. (The recipe assumes you bought the car in January of the year in question.)

■ **Interest tax savings** – marginal tax rate times monthly interest payments. (The recipe assumes you bought the car in January of the year in question.)

■ **Net monthly expense** – monthly cash payment minus tax savings.

■ **Total cash payments** – total of all the monthly cash payments until car is sold.

■ **Total tax savings** – total of all the monthly tax savings until car is sold.

■ **Down payment** – amount paid for the car in addition to the amount financed.

■ **Due on sale** – amount still owing on loan, if any, when car is sold.

■ **Total expenses, net** – total cash payments plus down payment plus amount due on sale minus tax savings.

■ **Present value, net expenses** – present value of above total.

■ **Present value purchase costs** – present value of net expenses associated with buying; use to compare with other purchase possibilities or with leasing.

## **32 Leasing Your car**

Shows the present value of the total costs associated with leasing a car so that you may compare different car lease possibilities or, by using the recipe in combination with recipe 31, different car purchase and lease possibilities. If you use recipes 31 and 32 to compare buying vs leasing for the same car, the best choice is the one with the lowest present value.

### **ENTRIES**

- **Initial payment** – first payment you make on the lease (typically larger than the regular monthly payment).
- **Monthly payment** – regular monthly payment you will make for the duration of the lease.
- **Number of payments** – number of regular monthly payments the lease obligate you to make.
- **Final payment** – amount of the final payment due at the end of the lease.
- **Tax credit** – dollar amount allowed for investment tax credit on the lease of the car (varies from one lease arrangement to another; consult with your financial advisor and with whomever you are leasing from. (Make sure the number reflects the percentage you are using the car for business).
- **Business deduction %** – percentage of lease expenses you may deduct from your income tax as a business expense (talk with your financial advisor if you are unsure about this entry).

■ **Interest rate earned, compounding periods, and marginal tax rate** – all used in the present value calculation. (See page 6 for an explanation of the concept of present value.) Marginal tax rate is also used to calculate tax savings.

### **ANSWERS**

- **Monthly cash payment** – same as monthly payment in entries.
- **Tax savings** – marginal tax rate times monthly cash payment times business deduction percentage. (*NOTE: valid only if lease is an operating lease; if lease is a capital lease, use recipe 31; capital leases should be treated the same as purchase.*)
- **Net monthly expense** – monthly cash payment minus tax savings.
- **Total cash payments** – sum of all the monthly cash payments for the length of the lease.
- **Total tax savings** – sum of all the monthly tax savings for the length of the lease plus the tax credit.
- **Total expense, net** – total cash payments minus total tax savings.
- **Present value, lease costs** – the present value of the above total.

# Technical Appendix — The Cookbook Formulas

## DEFINITIONS

I – Annual interest rate  
C – Compounding period per year  
Y – Number of Years  
P – Present value  
F – Future value  
Q – Payment  
IF – Inflation rate  
T – Marginal tax rate  
IE – Equivalent interest rate  
CAP – per cent of capital gain you pay tax on

## FUNDAMENTAL FORMULAS

NOTE: These formulas and their variants are used throughout the cookbook.

When present value formulas are applied to problems, the effect of taxes on interest is included.

### FUTURE VALUE OF SINGLE AMOUNT

$$F1. F = P(1 + I/C)^CY$$

### PRESENT VALUE OF SINGLE AMOUNT

$$F2. P = F/(1 + I/C)^CY$$

### EQUIVALENT INTEREST RATE USED IN MONTHLY PAYMENT PROBLEMS

$$F3. IE = (1 + I/C)^{(C/12)} - 1$$

### FUTURE VALUE OF MONTHLY PAYMENTS

$$F4. F = Q/IE((1 + IE)^{12Y} - 1)$$

### PRESENT VALUE OF MONTHLY PAYMENTS

$$F5. P = Q/IE(1 - (1 + IE)^{-12Y})$$

### INFLATION OF TODAYS \$ TO FUTURE

$$F6. F = P(1 + IF)^Y$$

### FUTURE VALUE IN TODAYS DOLLARS

$$F7. P = F/(1 + IF)^Y$$

### INCOME TAX ON TAXABLE AMOUNT

$$F8. TAX = INCOME(T)$$

**Recipe 1.** If yes to itemize question, Marginal = Fed. + State.  
Otherwise, Marginal = (1-Fed) \* State + Fed

**Recipe 2.** Future value from F1  
Today's dollars on net from F7

**Recipe 3.** Future value from F4  
Today's dollars on net from F7

**Recipe 4.** Inflate current value with F6  
Gets present value from F2

**Recipe 5.** Inflates current value with F6  
Gets payment by solving for Q in F4

**Recipe 6.** Computes a single month's interest by multiplying bank balance by IE; payments inflated yearly with F6

**Recipe 7.** Interest computed as in recipe 6

**Recipe 8.** Profit = F-P-service charge  
Tax = T times profit  
Rate of return = 365.25/(days held) x profit/(P + serv chg)

**Recipe 9.** Profit = F-P  
Tax = profit x CAP x T  
Rate of return found by solving F1 for I

**Recipe 10.** Profit = F-P  
If long term tax from recipe 9  
If short term tax = T x profit  
Interest rate found by solving F1 for I

**Recipe 11.** Uses F2

**Recipe 12.** Uses F5

**Recipe 13.** For non IRA  
Initial tax of TxP deducted  
Resulting problem uses recipe 2  
For IRA  
Uses formula 1

**Recipe 14.** Future value from F1  
Today's dollar from F7

**Recipe 15.** Works identically to recipe 6 except whole withdrawal is taxed

**Recipe 16.** Penalty is 10% of withdrawal  
Tax is  $T \times$  withdrawal

**Recipe 17.** Withdrawals are  $12 \times$  initial amount +  $12 \times$  initial amount  $\times (1 + IF)$   
Result then used in recipe 6 to produce answer.

**Recipe 18.** Payment by solving F5 for Q  
 $\text{Interest} = I/12 \times \text{remaining balance}$

**Recipe 19.** Works as in recipe 18, monthly amounts displayed

**Recipe 20.** Method of recipe 18 used for rates varying in .25% increments  
Interest is first month's

**Recipe 21.** Initial payment calculated as in recipe 18  
Interest is current rate /12 x current balance

**Recipe 22.** Works as in recipe 18 except, interest = interest on first + rate on second  $\times$  second amount  
Balance = balance on first + second amount

**Recipe 23.** Works as in recipe 18  
Balloon payment due is remaining balance from app 18 in year of balloon

**Recipe 24.** Calculated from F5

**Recipe 25.** Tax savings computed annually from F2  
Present value of payments computed monthly using F5  
Present value of sale from F2  
Net present value = difference of prior pv's

**Recipe 26.** Initial payment and schedule from recipe 18  
Balance at year of increase used to find new payment  
Schedule continues from recipe 18

**Recipe 27.** Rent

Present value of rental payments  
Monthly present value for one year's worth of payments with F5  
F2 applied to each year's total  
Buy  
Maint, ins, and prop tax inflated each year by IF  
Present value handled as with rent

**Recipe 28.** The "trick" here is that we assume the current fuel bill is for the month entered. We find the average inflation for the first year and report this as the old cost.  
(cost  $\times (1 + IF/1)$ )

For the new cost, we start with a first month cost = original cost minus savings. Then, we apply the "trick" (savings = old - new) and calculate the present value from F2. For next year, the first month's fuel bill is inflated by full inflation rate, and then the cycle above repeats.

**Recipe 29.** Monthly payment from F5

**Recipe 30.** Monthly payment from F5

**Recipe 31.** Payment from F5

Depreciation uses ACRS method  
Basis = purchase price - .5 x tax credit  
First year = .25 x basis  
Second year = .38 x basis  
Third year = .37 x basis  
Only business % x above allowed

Tax savings  
 $T \times (\text{interest} + \text{allowed depreciation})$   
Tax liability of sale computed as follows: price of sale - value left after depreciation  $\times$  tax rate  $\times$  business deductions percentage  
Present value computed monthly with F5

**Recipe 32.** Present value of payments computed using F5

# Glossary List for Financial Cookbook

**APR** – stands for Annual Percentage Rate. Same as loan interest rate in recipes 29, 30 and 31.

**ACCELERATED COST RECOVERY SYSTEM (ACRS)** – Depreciation method required by the IRS and used in recipe 31 for automobiles. The ACRS rules require that a car used for business purposes be depreciated over a three year period with 25%, 38%, and 37% of the depreciation in each of the first three tax years, respectively, regardless of the calendar date in the first year when the car was purchased.

**ACTUAL TAX % LAST YEAR** – In recipe 1, total state and federal taxes paid last year divided by total taxable income last year.

**ADJUSTED FOR INFLATION** – Dollar amount some number of years in the future that has been reduced by multiplying it by the inflation rate once for each year.

**AFTER-TAX** – Amount after all taxes have been subtracted.

**AFT-TAX** – After-tax.

**AMORTIZATION SCHEDULE** – List of payments over time that will reduce and pay off (or “amortize”) a loan.

**AMOUNT FINANCED** – Amount paid for with a loan at the time of purchase.

**AMOUNT LEFT TO SPEND** – Amount remaining to spend in recipe 16 after taxes and early withdrawal penalties have been paid. Same as “Amount you need”.

**AMOUNT OF DEPOSIT** – Dollar amount that is to be put into an interest-bearing account today in recipes 2, 10, and others.

**AMOUNT OF MORTGAGE** – Dollar amount borrowed to pay for all or part of a home purchase.

**AMOUNT YOU MUST WITHDRAW** – Amount in recipe 16 that must be withdrawn from an IRA account so that the amount needed is left over after taxes and penalties are paid.

**AMOUNT YOU NEED** – Same as “Amount left to spend.”

**ANNUAL MAINT. & INSUR.** – Annual maintenance and insurance costs.

**ANNUAL RENT INCREASE** – Average percent increase that is expected in rent each year.

**ASSET** – Something of tangible value that is owned, e.g., car, boat, bank account.

**BALANCE** – Amount left or remaining after some adjustment, e.g., after interest has been added or taxes have been subtracted.

**BASIS** – Base amount from which a gain or loss is calculated.

**BALLOON PAYMENT** – An especially large payment in the future or at the end of a loan, used in order to reduce the amount of regular payments for the loan.

**BALLOONS** – Balloon payments.

**BUY PWR** – Buying power.

**BUYING POWER** – Amount in the future that has been reduced to take the expected annual inflation rate into account.

**BUSINESS DEDUCTION %** – Percentage of time or use of an asset that is for business and therefore qualifies as tax-deductible.

**CAPITAL GAIN** – Profit from the increased value of certain kinds of assets, e.g., houses, common stock, art.

**CAPITAL GAINS RATE** – Percent of capital gain that is taxable at normal rates. Remaining percentage is not taxed at all and therefore investments with capital gains have a lower overall effective tax rate.

**CAPITAL LEASE** – Form of lease in which the car or property is treated as an asset for tax purposes.

**CAR'S VALUE WHEN SOLD** – Price for which car can be sold in the future.

**CASH AVAILABLE FROM REFINANCE** – Cash left over in recipe 25 if new loan is greater than the sum of the costs of getting the new loan and the principal of the old loan.

**CASH COSTS** – Actual net “out of pocket” cash expenses; does not include expense of depreciation, whose cash impact is felt only when the asset is sold.

**CASH FLOW** – Positive and negative cash amounts over time that are caused by an investment or expenditure. Frequently used in present value calculations and comparisons. For example, putting \$1000 in a savings account with 5% tax free interest for two years results in a “negative cash flow of \$1000 now, a “positive” cash flow of \$50 for interest at the end of each of the two years, and a “positive” cash flow of \$1000 when the savings are withdrawn.

**COMBINED MARGINAL TAX RATE** – Overall tax rate on next \$1 earned, taking into account federal and state taxes. If deductions are itemized, then state taxes can be deducted from income reported to IRS.

**COMPOUNDING PERIODS** – Number of times per year that interest is computed and paid into an account, with the amount of interest paid depending on the length of the period since last period ended. Whole numbers from 1 to 366 are allowed. The term “compounding” is used to highlight the effect of earning interest on the interest earned last period, and so on.

**COST TO INSTALL DEVICE** – Total pre-tax dollar cost of buying and installing energy saving device in recipe 28.

**COST TO REPAIR** – In recipe 30, dollar amount it will cost to make car fully operational.

**CURRENT CAR VALUE** – Amount for which car could be sold today.

**CURRENT MORTGAGE BALANCE** – Amount of principal still owed on mortgage today.

**DAYS HELD** – Number of days that a treasury bill or similar investment will be owned before it is paid off, or matures.

**DEPOSIT** – Dollar amount to be placed in an interest-bearing account.

**DEPRECIATION** – Process by which an asset “wears out” and loses its value. In recipes 29 and 30, if the car declines in value from today until it is sold in the future, the depreciation is calculated on a “straight-line” basis as though it loses the same amount each day until it is sold. For tax purposes more rapid depreciation rates are desirable (since depreciation is deductible if it is a business expense), hence recipe 31 uses the ACRS method of depreciation provided by the IRS. (*NOTE: Not all states have adopted ACRS, consult your financial advisor.*)

**DEVICE PAID FOR IN n YEARS** – If “n” is some number of years, then the energy saving device in recipe 28 will have saved enough in energy costs in “n” years to justify the net costs of installation.

**DISCOUNT RATE** – Rate at which it is assumed that investments can increase in value annually, described in many recipes as “interest rate earned”. This rate is used to discount the future cash flows in all recipes that use present value calculations in order to make comparisons in current dollars.

**DOWN PAYMENT** – Cash amount paid by buyer as a portion of total purchase price of a car or a house, with the remainder to be financed through a loan or mortgage.

**DUE DATE** – Calendar date when a payment must be made.

**EARNINGS** – Profit from an investment.

**ENERGY SAVING DEVICE** – Insulation, solar heaters, and other devices which can be installed to reduce utility bills.

**ENDING** – Answer to end of time period being analyzed.

**EQUIVALENT AMOUNT TODAY** – Present value, or the amount of cash needed today to invest at the “interest rate earned” (or discount rate, or investment rate) to produce the future amount or amounts shown in the recipe.

**EQUIVALENT INTEREST RATE** – Rate computed in recipe 10 at which a current dollar sum can be invested and grow into specified future sum. This rate is the annual expected pre-tax rate of return, interest rate or investment rate. The rate is also the “discount rate” or “interest rate earned” at which the specified future sum can be discounted to a present value that is the current dollar sum used in the recipe.

**ESTIMATED RESALE VALUE** – Sale price at which an asset like a home can be sold.

**EXPECTED FUTURE VALUE** – Dollar value you expect something to have at a specified point in the future.

**EXPECTED MONTHLY PAYMENT** – Amount you expect to receive each month in recipe 12.

**FEDERAL TAX** – Income tax dollars paid to the IRS.

**FEDERAL MARGINAL TAX RATE** – Amount of tax paid to the IRS on the next \$1 of income. Marginal tax rates are shown in the tax tables in form 1040.

**FINAL PAYMENT** – Leasing term in recipe 32 for the payment at the end of the lease term, frequently a larger payment than normal.

**FIRST MORTGAGE AMOUNT** – Principal balance of first mortgage in recipe 22 when the loan was first obtained.

**FUEL INCREASE RATE** – Annual percent increase in utilities bills in recipe 28.

**GAIN** – Increase in value, or profit.

**HOLDING PERIOD** – Length of time that a capital gains investment is owned.

**IRA** – See Individual Retirement Account.

**IRS** – Internal Revenue Service, tax collection agency of the U.S. federal government.

**ITC** – See Investment Tax Credit %

**INDIVIDUAL RETIREMENT ACCOUNT (IRA)** – A tax shelter provided by federal law that allows an individual to put up to \$2000 annually into an IRA approved investment or account. Taxable income is then reduced by the amount of the IRA investment (up to \$2000) resulting in an immediate tax savings, and the IRA account can earn interest or otherwise grow in value without being exposed to taxation until the money is withdrawn. The only “catch” is that there is a

penalty of 10% on any withdrawals before the person is 59.5 years old, and the amount of the withdrawals must be included in taxable income for the year withdrawn.

**INFLATION RATE** – Annual percentage decrease in buying power, normally shown as an increase in the “consumer price index” of common household items and other purchases. Inflation applies only to changes in the real purchasing power of a dollar and does not reflect price changes that are due to short-term shortages or abundances in supply and demand.

**INITIAL** – First one or original.

**INITIAL PAYMENT** – In recipe 32, is first lease payment, which may be different (typically greater) from the normal payments.

**INITIAL SAVINGS BALANCE** – Dollars in savings account today, or at start of recipe calculations.

**INSURANCE NEEDED** – Amount of insurance needed in recipe 17 to maintain standard of living for number of years specified. If invested at the “interest rate earned” in the recipe, this insurance amount will last long enough to provide the buying power of current monthly income, despite inflation, for the number of years specified. (Whether the insurance is while life or term does not matter to recipe 17.)

**INTEREST** – Profit paid in exchange for the use of funds; e.g., a bank offers to pay interest to anyone who will allow the bank to keep (and use) their funds. Because they specialize in the economic uses of money, banks assume they can generate enough profit from the use of money to more than make up for the interest they must pay to anyone who has a savings account.

**INTEREST EARNED** – Dollar amount of profit from interest.

**INTEREST LOST** – Amount of profit calculated at an assumed “interest rate earned” that was not earned since some cash in the recipe was used for a purpose that did not pay interest. Recipes 29 and 30, for example, involve different cash costs for repairs or down payments. If cash must be invested in a car and taken out of a savings account or other investment, then it will no longer be earning interest; this is the “lost interest” which must be considered part of the cost of the car (also can be called “opportunity cost”).

**INTEREST ONLY SECOND MORTGAGE** – Mortgage that is obtained in addition to original mortgage. Unlike regular mortgages where principal is gradually paid off, interest only second mortgages have lower payments that cover the interest only, and the principal is paid off with a balloon payment at some point in the future.

**INTEREST RATE EARNED** – Annual percentage amount used in several recipes to reflect the pre-tax interest savings rate or pre-tax rate of return that is expected on a typical investment. In many recipes this rate is used as the “discount rate” in net present value calculations.

**INVESTMENT** – Assets like accounts, properties, securities, T-bills, and others in which the intention is to increase wealth through savings interest, income, capital gains, or other forms of profit.

**INVESTMENT TAX CREDIT %** – In recipe 31, refers to percentage used to calculate the amount of tax credit due a buyer. Currently 6% of the purchase price of 3-year life assets.

**ITEMIZED DEDUCTION** – Tax filing option that requires describing in detail all tax deductible spending in various categories. Many people find they can save money by itemizing deductions if they own their own home, are borrowing money, have investments other than a savings account, or own their own small business.

**LEASE** – Formal contractual agreement to allow the use of an asset like a car in exchange for an agreed-upon schedule of payments. For tax purposes, the payments are treated as expenses. Many leases also provide an option to buy the asset at the end of the lease for a specified amount. Recipe 32 allows a car lease to compare to buying. Some leases are considered to have value as assets and are called “capital leases”. The tax effects of capital leases are similar to buying the asset, so for car recipe 31 should be used.

**LENGTH OF MORTGAGE** – Number of years mortgage payments must be made to amortize the loan.

**LONG-TERM CAPITAL GAIN** – Capital gain on an asset that has been owned for the tax period required to qualify for reduced taxes as a “long-term gain”. For federal taxes this is one year; state laws may vary.

**LUMP SUM** – Large payment that must be made at one time in a “big lump”.

**MAINT, INS, FEES** – Maintenance, insurance, and other fees.

**MARGINAL TAX RATE** – Percent of next \$1 earned which must be paid in taxes. Because tax tables provide for a higher tax rate for higher levels of income, the marginal tax rate is normally higher than the actual tax rate paid.

**MO** – Month.

**MONTHLY FUEL SAVINGS** – Monthly dollars saved in fuel or utility costs as a result of installing an energy saving device in recipe 28.

**MONTHLY MORTGAGE PAYMENT** – Payment of interest and principal each month that will amortize (pay off) a mortgage over the life of the loan.

**MORTGAGE INTEREST RATE** – Annual percentage rate of interest that must be paid in order to borrow for the purchase of a home.

**MORTGAGE SCHEDULE** – List of payments over time describing the amortization of a mortgage. Mortgages are typically designed to have a constant payment amount including both interest and principal. As the principal amounts are paid, however, the principal balance is declining and hence the amount of interest due declines and even more principal can be paid off from the constant payment amount. In this way the payment shifts over the life of the loan from being mostly interest to mostly principal until the mortgage is paid off.

**NPV** – Net Present Value or Present Value. A method of calculating the expected utility of a given investment or expenditure by discounting all expected future cash flows to the present, using some predetermined minimum desired rate of return.

**NET** – Final sum after positive and negative amounts have been added in.

**NET AFTER TAXES** – Final sum after taxes have been subtracted.

**NET SAVED** – Net cumulative savings from installing an energy saving device in recipe 28.

**NEW COST** – New, reduced utility bills after energy saving device is installed in recipe 28.

**NON-IRA** – Savings or another investment alternative to IRA in recipe 13.

**NUMBER OF YEARS** – Period of time to analyze or perform calculations from.

**OLD COSTS** – Utility or fuel costs in recipe 28 assuming that no device is installed.

**OPPORTUNITY COST** – Economics concept that says that the cost of choosing between two alternatives is that one can't have both. For example, if cash is invested in a down payment for a house, then it is no longer available to earn interest in the bank or in another investment.

**ORIGINAL MORTGAGE AMOUNT** – Principal amount of mortgage when it was originally obtained.

**OTHER CLOSING COSTS** – Fees that may have to be paid, such as title search, when a new loan is obtained as in recipe 25.

**PAYOUT** – Point at which a major payment is made, typically to complete amortization of a loan so that the loan is fully paid off and no more interest is due.

**PAYOUT PENALTY** – Fees that must be paid on some loans if the loan recipient wishes to repay the loan faster than originally agreed upon.

**PENALTY** – Fees that must be paid in some situations like early IRA withdrawals to compensate for doing something outside the normal rules for the account.

**POINTS PAID** – Loan fee sometimes requested by a bank or lending organization in exchange for providing a loan, expressed as a percentage of the total loan. For example, paying 2 points on a \$20,000 loan generates a fee of \$400.

**PRES VALUE** – Present Value.

**PRESENT VALUE (PV)** – The dollar amount needed today to invest at a specified interest rate earned (or discount rate) to produce the same value as a specified alternative investment. Present value calcula-

tions provide a method for comparing two investments which have different time schedules for when dollars are invested and when profits are earned and in what magnitudes.

**PRES VAL, COSTS - CASH - EQUITY** – in recipe 25, present value of the cost of the new loan minus the cash from refinancing minus the present value of the future equity.

**PRES VALUE, COSTS-EQUITY** – In recipe 25, the present value of your expenses minus the present value of your profit.

**PRES VALUE, COSTS-SALE** – In recipe 27, present value of sum of effects of buying a home including down payment, cash flows from mortgage, tax benefits, and net gain or loss from the sale of the home.

**PRES VALUE FUTURE EQUITY** – In recipe 25, the present value of the resale value - mortgage balance remaining.

**PRESENT VALUE ENERGY SAVINGS** – Present value of savings cash flow from installing an energy saving device in recipe 28. Includes cash flow for number of years indicated by "Years to analyze" only.

**PRESENT VALUE LESS COST** – "Present value, energy savings" reduced by the initial cost of the device in recipe 28.

**PRESENT VALUE, NET EXPENSES** – Present value in recipe 25 for the cash flow from a loan, including mortgage payments, tax savings from interest deductions, and the eventual sale of the home.

**PRESENT VALUE PURCHASE COSTS** – Present value of net costs of purchasing a home in recipe 27, including mortgage factors, tax savings, and resale of the home.

**PRESENT VALUE RENTAL COSTS** – Present value from the cash flow of monthly rent.

**PRES VALUE, SALE** – Present value in recipe 27 of resale value of house, minus selling cost and any outstanding mortgage principal balance.

**PRE-TAX** – Amount before taxes have been subtracted or taken into consideration.

**PRINCIP** – Principal.

**PRINCIPAL** – Loan amount that was originally borrowed with any repayments of principal subtracted, stated as a balance that remains to be paid off ("the mortgage balance is \$50,000 principal"). Mortgage payments are divided into portions for interest and principal. The interest is derived from the interest rate and the outstanding principal balance; the principal portion of the payment goes towards reducing the principal balance.

**PROFIT** – Increased value or gain after expenses from an asset or investment, such as interest on a savings account, selling a home for a higher price than was originally paid. Profit is normally calculated by

subtracting the expenses associated with the investment from the income to obtain pre-tax profit, and then subtracting taxes to obtain the after-tax or "net" profit.

**PROPERTY TAXES** In recipe 27, the annual property taxes paid on a home.

**PURCHASE PRICE** – Amount in recipes 8, 29 and others that is the price that must be paid today to buy the T-bill, car, or other asset in question.

**RATE** – Annual charge, increase or decrease, expressed as a percentage. For example, a "10% rate of increase" in rent would mean that rent next year will be 10% higher than this year.

**RATE OF RETURN** – Annual percentage change in the value of an investment. This is normally expected to be a positive increase. (e.g., a 10% rate of return increases the value of the investment by 10% in one year). Rate of return is a way to express the profit that is expected from an investment in an annual percentage rate. For savings and similar accounts, the interest rate is the rate of return; for other investments it may include other factors like the resale value of a home, service charges on a T-bill, increased value of a work of art, and so on. The term "Interest rate earned" (or "discount rate") which is used in many recipes is an attempt to reflect the pre-tax rate of return that can be obtained on a typical investment. In all recipes involving "Interest rate earned" or "Rate of return" the calculations are performed both pre-tax and after-tax if a tax rate is used.

**REDEMPTION PRICE** – Or "face value", the amount that will be paid to the holder of a T-bill or similar investment when it is "cashed in". T-bills basically earn interest like other savings accounts, but the increased value of the T-bill is shown as a difference between the purchase price and the redemption price some specific number of days in the future. Since the number of days is specified, it is possible to calculate the comparable interest rate that the T-bill is really earning by using recipe 8.

**REFINANCING** – Replacing an existing mortgage with a new mortgage. This is worth considering if the interest rates today are much lower than the rate that is being paid on the existing mortgage.

**REPAIR COSTS FINANCED** – In recipe 30, the dollar amount of any automotive repairs that are paid for with a loan.

**RETIRING A LOAN** – Paying off all obligations, including any interest that is due and the remaining principal balance, causes the loan agreement to end, or be "retired". A mortgage can be retired early by increasing the monthly payment amount as shown in recipe 26.

**SECOND MORTGAGE** – An additional mortgage added on to the existing mortgage in recipe 22. Called a "second" because in the event of foreclosure, the bank that granted the original mortgage is "first" in line to recover the money that it is owed, and the second mortgage is "second" in line. Because of the possibly greater risk of being second in line, second mortgages may have a different interest rate or other requirements in order to compensate.

**SELLING COSTS** – Cash costs of selling a home as in recipe 27. One such cost is the typical sales commission to a real estate broker of around 6% of the selling price.

**SERVICE CHARGES** – Fee or commission that may be charged when a T-bill is purchased in recipe 8. This fee is added to the purchase price to reflect what the investment really cost before profit is calculated.

**SHORT-TERM CAPITAL GAIN** – Capital gain on an asset that has not been owned long enough to qualify for the reduced taxes of a long-term capital gain. Any holding period less than a year is considered short-term by the federal government. State laws may vary.

**STATE MARGINAL TAX RATE** – Percentage of the next \$1 in income that would be paid in state taxes. Shown specifically in state tax tables.

**STATE TAX** – Actual dollar amount of state taxes paid. As a percentage of income, should be lower than state marginal tax rate since tax rates increase as income increases.

**STATE TAX DEDUCTION** – If deductions are itemized, any state taxes actually paid during a calendar year can be deducted from taxable income on the federal tax return for the same year.

**T-BILLS** – Treasury bills are an investment in which a fixed amount, such as \$9,500, is given to the federal treasury in exchange for an agreement, or T-bill, that the treasury will give you \$10,000 in exactly 180 days. The net effect is as though you put \$9,500 in a savings account and earned \$500 in interest in the first 180 days.

**TAX CREDIT** – Tax savings allowed by federal government to encourage investment in capital purchases like energy saving devices, production machinery, and cars used for business. Tax credits are a big savings since they come off the "bottom line": the amount is subtracted from the actual taxes owed rather than from taxable income. Thus it is a dollar-for-dollar savings on taxes that would have been paid, whereas a reduction in taxable income would only result in a savings equal to the marginal taxes on the reduction in income.

**TAX CREDIT \$** – In recipe 28, refers to dollar amount of tax credit from installing an energy saving device. The amount should be calculated by hand after determining what percentage of the installation cost is allowed depending on state and federal law and the class of the device.

In recipe 32, refers to dollar amount of any tax credit due from leasing a car for business purposes. Amounts vary from lease to lease. (Ask whomever you're leasing from and/or your financial advisor for a figure.)

**TX PD** – Taxes paid.

**TAX RATE AT RETIREMENT** – Total combined state and federal marginal tax rate that will be paid during retirement years, based on expected taxable income at that time.

**TAX RATE, BUYING** – Combined state and federal marginal tax rate that will be paid if home is purchased. This may be a lower overall rate than the tax rate if no home is owned since interest expenses from a

home mortgage are subtracted from taxable income if deductions are itemized on the tax return.

**TAX RATE, RENTING** – Combined state and federal marginal tax rate that will be paid if no home is owned by taxpayer. If no home is currently owned then the marginal rate produced by recipe 1 or one already put in the Profile may be used.

**TAX SAVINGS** – Dollar savings from tax effects of an investment, such as interest and points paid in property recipes like 25 and 27, interest on a car loan in recipes 29, and 30, and interest, depreciation, and tax credit effects in recipes 31 and 32.

**TAX SHELTER** – An investment (like an IRA deposit) or expenditure (like an interest payment) that reduces taxable income.

**TAXABLE INCOME** – Wages, interest, income from investments, capital gains, and other profits in a tax year that the IRS considers subject to taxation.

**TAXDUE** – Amount of cash that must be paid for taxes in each year. In recipe 13, this is a large percentage of the deposit amount for the year shown as "NOW" since the non-IRA deposit is treated as taxable income before it is available for an investment.

**TAXES ON GAIN** – Amount of taxes that must be paid on the profit from the increased value of an investment.

**TAXES PAID** – Amount of taxes that must be paid.

**TOT** – Total.

**TOTAL CASH PAYMENTS** – Sum total of regular cash payments that must be made. For example, in recipe 31 this is the sum of the monthly loan payments but does not include the down payment, which is shown on a separate line.

**TOTAL WITHDRAWN** – In IRA recipes like 15, this is the sum total of cash withdrawals over the time period analyzed.

**TRADE-IN VALUE OF OLD CAR** – Cash amount that could be obtained from selling or trading-in current car today.

**TREASURY BILLS** – See T-bills.

**VARIABLE RATE AND PAYMENT MORTGAGE** – Mortgage in which the interest rate and therefore the payment amount are periodically adjusted to account for changing interest rates. See recipe 20.

**VARIABLE RATE, FIXED PAYMENT MORTGAGE** – Mortgage where the interest rate may be adjusted periodically but the monthly payment remains fixed. Since a mortgage payment includes both interest and principal payments, keeping the payment amount the same while increasing the interest rate will mean that a greater percentage of the payment must be used to pay the interest. In fact, as some of the results in the table from recipe 21 indicate, if the interest rate is high enough it may exceed the payment amount, in which case the "overcharge" is added to the balance of principal that is owed. For interest

rates where this occurs, it is shown in the table as a negative monthly principal payment.

**VARIABLE RATE MORTGAGE** – Mortgage which allows lender to change the interest rate periodically if their own borrowing rates go up or down. This approach allows the lending institution or bank to reduce its risk and makes it possible for them to lend money in times when there is a great deal of uncertainty about future interest rates.

**WITHDRAWAL** – Removal or subtraction of fund from an account.

**WITHDRAWAL PENALTY** – Fee or percentage penalty that is owed if a withdrawal is made from an account sooner than the account agreement allows. For example, the federal government allows favorable tax treatment for deposits into an IRA account because it is intended to be savings for retirement. However, the government charges a penalty for withdrawal prior to the age of 59.5, since that would indicate a different possible use of the funds.

**YEAR BALLOON IS DUE** – Number of years from now that a balloon payment must be paid off or refinanced with a new loan agreement.

**YEAR TO REVIEW** – Recipe 19 allows any individual year's exact principal and interest payments to be examined on a mortgage that may last several years.

**YEARLY DEPOSIT** – Amounts that will be added to account each year from regular deposits.

**YEARS** – Whole number up to 99.

**YEARS PAID ON LOAN** – In recipe 25, refers to number of years existing mortgage has already been in effect, and allows the recipe to calculate the principal balance and interest payments remaining on the loan today.

**YEARS TO ANALYZE** – Number of years into the future over which investment or other analysis should take place, and number of years that will be printed in the table. In recipe 28, where present value calculations are being performed, it is important to analyze a reasonably long number of years so that the potential savings in future years are fully counted.

**YEARS TO RECEIVE INCOME** – In recipes 12 and 17, the number of years that the payment or income amount is going to be obtained.

**YEARS UNTIL SALE** – Years from today until you expect to sell the property. In order to fully account for all investment and tax effects, this should be estimated and included even if there are no plans to sell the house.

**YR** – Year.

**YR NOW** – The current tax year now in progress.

**YR 1** – Next year or one tax year from now.

# **Index for Financial Cookbook**

Though the recipes in the Cookbook use specific labels, they may be used to solve problems other than the ones the labels specify. Buying Your Car could, for instance, also be used to evaluate buying a boat or other similar item. This index has been designed to suggest some of those possible additional applications — as well as to speed your search for the recipe that fits your problem.

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TAX SHELTER

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